assume an oval or circular figure, forming long bead-like strings by the approximation of their edges. In saline solutions they become rather smaller, but preserve their figure tolerably well.

In an appendix, the author gives an account of his observations of the blood-corpuscles of a new species of Deer inhabiting the mountains of Persia, of which a specimen has been lately received by the Zoological Society. Many of these corpuscles presented the singular forms above described.

A paper was also read, entitled "Meteorological Register kept at Port Arthur, Van Diemen's Land, during the year 1838." By Deputy-Assistant Commissary-General Lempriere, in south latitude 43° 9′ 6″, and east longitude 147° 51′ 33″. Communicated by Captain Beaufort, R.N., F.R.S.

The height of the instrument above the level of the sea till the 21st of August was 57 feet, 7 inches; and during the remainder of the year 3 feet.

A paper was also in part read, entitled "Experimental Researches in Electricity, 16th Series." By Michael Faraday, Esq., D.C.L., F.R.S., &c.

February 13, 1840.

The MARQUIS of NORTHAMPTON, President, in the Chair.

Martin Barry, M.D. and Joseph Phillimore, LL.D., were balloted for, and duly elected into the Society.

The reading of a paper, entitled "Experimental Researches in Electricity, 16th Series." By Michael Faraday, Esq., D.C.L., F.R.S., &c., was resumed and concluded. On the source of power in the Voltaic pile.

The determination of the real source of electrical power in galvanic combinations has become, in the present state of our knowledge of electricity, a question of considerable importance, and one which must have great influence on the future progress of that science. The various opinions which have been entertained by philosophers on this subject may be classed generally under two heads; namely, those which assign as the origin of voltaic power the simple contact of dissimilar substances, and more especially of different metals; and secondly, those which ascribe this force to the exertion of chemical affinities. The first, or the theory of contact, was devised by Volta, the great discoverer of the Voltaic pile; and adopted, since it was promulgated by him, by a host of subsequent philosophers, among the most celebrated of whom may be ranked Pfaff, Marianini, Fichner, Zamboni, Matteucci, Karsten, Bruchardat, and also Davy; all of them bright stars in the exalted galaxy of science.

The theory of chemical action was first advanced by Fabroni, Wollaston, and Parret; and has been since farther developed by Oersted, Becquerel, De la Rive, Ritchie, Pouillet, Schonbein, and others. The author of the present paper, having examined this question by the evidence afforded by the results of definite electro-chemical action, soon acquired the conviction of the truth of the latter of these theories, and has expressed this opinion in his paper, published in the Philosophical Transactions for 1834.

The author, after stating the fundamental doctrine laid down by Volta, proceeds to give an account of various modifications in the theory introduced by subsequent philosophers; and also of different variations in the views of those who, in the main, have adopted the chemical theory. Being desirous of collecting further and more decisive evidences on this important subject, he engaged in the series of experimental researches which are detailed in the present memoir.

It is assumed, he observes, by the advocates of the contact theory, that although the metals exert powerful electromotive forces at their points of mutual contact, yet in every complete metallic circuit, whatever be the order or arrangement of the metals which compose it, these forces are so exactly balanced as to prevent the existence of any current; but that, on the other hand, fluid conductors, or electrolytes, either exert no electromotive force at their place of contact with the metals, or, if they do exert such a power, the forces called into play in the complete circuit are not subject to the same law of compensation as obtains with circuits wholly composed of metallic bodies. The author successfully combats this doctrine, by bringing forward a great number of instances, where certain fluids, which have no chemical action on the metals with which they were associated in the circuit, are in themselves such good conductors of electricity, as to render evident any current which could have arisen from the contact of the metals, either with each other or with the fluid; the evidence of their possessing this conducting power being their capability of transmitting a feeble thermo-electric current from a pair of plates of antimony and bismuth. The following he found to be fluids possessing this property in a high degree; namely, a solution of sulphuret of potassium, yellow anhydrous nitrous acid mixed with nearly an equal volume of water, very strong red nitric acid, and a mixture of one volume of strong acid with two volumes of water. By employing the solution of sulphuret of potassium as an electrolyte of good conducting power, but chemically inactive with reference to either iron or potassium; and associating it with these metals in a circuit, formed by two test-glasses containing the solution, into one of which was immersed a plate of platina and a plate of iron, and in the other two plates of platina; and the circuit being completed by wires of the same metals respectively, joining the iron-plate in the first glass with one of the platina-plates in the second, while the other two platina-plates were united by platina wires, interrupted at one part by a short iron wire which joined their ends;—it was found by the test of an interposed galva-

nometer, that, as no chemical action took place, so no electric current was produced; yet the apparatus thus arranged could transmit a very feeble thermo-electric current, excited by slightly raising the temperature of the wires at either of their points of contact. Hence, the inference may be drawn, that the contact of iron and platinum is of itself productive of no electromotive force. On the other hand, the author shows, that the interposition in the circuit of the smallest quantity of an electrolyte, which acts chemically on either of the metals, the arrangement remaining in all other respects the same, is immediately attended with the circulation of an electrical current far more powerful than the thermo-electric current above-mentioned. A great number of combinations of other metals were successively tried in various ways, and they uniformly gave the same results as that of iron and platina. Similar experiments were then made with various metallic compounds, and also with other chemical agents; and in all cases the same general fact was observed; namely, that when no chemical action took place, no electrical current was excited; thus furnishing, in the opinion of the author, unanswerable arguments against the truth of the theory of contact. The only way in which it is possible to explain these phenomena on that theory, would be by assuming, that the same law of compensation as to electro-motive power is observed by the sulphuret of potassium, and the other fluids of corresponding properties, as obtains in the case of the metals, although that law does not apply to the generality of chemical agents; and in like manner, different assumptions must be made in order to suit the result in each particular combination, and this without any definite relation to the chemical character of the substances themselves; assumptions, which no ingenuity could ever render consistent with one another. At the conclusion of the paper, the author describes some remarkable alternations in the phenomena which occur, when pieces of copper and silver, or two pieces of copper, or two of silver, form a circle with the yellow sulphuretted solution; and which lead to the same conclusion as the former experiments. If the metals be copper and silver, the copper is at first positive, and the silver remains untarnished; in a short time the action ceases, and the silver becomes positive, at the same time combining with sulphur, and becoming coated with sulphuret of silver; in the course of a few minutes, the copper again becomes positive; and thus the action changes from one side to the other in succession, and is accompanied by a corresponding alternation of the electric current.

February 20, 1840.

The MARQUIS of NORTHAMPTON, President, in the Chair.

John Caldecott, Esq., was balloted for, and duly elected into the Society.